

**Zischg, A., Moran, A., Meissl, G. & Stötter, J. (2004):** From probability to possibility-modelling the system behaviour of natural hazards using fuzzy set theory. Geophysical Research Abstracts EGU Joint Assembly, Nice, France 2004. Vol. 6, Nr. 04982.

### **Abstract**

Temporary risk mitigation measures such as the closing of roads or the evacuation of settled areas require a better knowledge of the variable, short term behaviour of geomorphologic processes in a defined system. Hitherto risk has been mainly defined by long term investigations carried out on the foundation of statistical analyses. However, such an approach hampers the modelling of short term variations within a given system as illustrated by an investigation to survey the daily risk along traffic lines based on encounter probability. Consequently, the limits of this method soon become clearly obvious due to the insufficient statistical basis. Moreover the computation of the daily release probability is subject to significant uncertainties. A more adequate way to simulate the varying trigger dispositions of an avalanche release is to compute the measure of possibility by using an expert system. Initial studies performed on snow avalanche paths and in torrent catchments point out that the application of an inference engine to analyse a rule base is indeed suitable for the evaluation/modelling of environmental conditions. This allows statistically non-significant parameters as well as the preconditions of the system to be taken into consideration. The comparison of the approaches based on the probability theory to the fuzzy rule base systems leads to the conclusion that the fuzzy set or possibility theory opens an abundance of opportunities to estimate the occurrence of an undesired event for variable time periods. This approach allows uncertainties in the data basis to be dealt with. Furthermore it seems to be more objective and transparent than other conventional methods. As such, the possibility measure presented here constitutes a potential basis for dealing with short term risks, as according to the definition of the possibility of an expected loss.